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Updating and 'future-proofing' a rich Computer Aided Language Learning resource

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Abstract

A collaborative partnership that endured over nine years resulted in the establishment of a rich computer-based resource of language learning materials. While the linguistic content, the design and the activities did not age, the platform and application used to deliver were both reaching the end of their life-time. In the case of the former, Apple Computer was moving to a new operating System in OS X and at the same time, their HyperCard application was not going to be supported through the OS change and would thus fade away. All CALL resources that had been developed were Apple OS and HyperCard only.

Keywords

Computer Aided Language Learning, Blackboard Vista, HyperCard, Runtime Revolution

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From the editor…

Welcome to the July-October 2007 issue of Learning Technology.

Many advances in learning technologies are happening throughout the world. This issue focuses in bringing these new developments and emerging technologies to the readers. This issue contains papers ranging from practical learning technology solutions to theoretical underpinnings of learning technology.

Stace looked at how future CALL technologies can be developed in a way that is independent of the learning environment. He looked ways in which future developments will not be locked into a particular environment but rather can be run on any environment. Sanchos, Fuentes and Fernandez-Manjon looked at an eLearning system which uses a game-based approach to engage the learners. Their argument stems from the concept that the current technology savvy learners get bored easily with traditional approaches hence a more engaging learning environment is needed. An eLearning system named NUCLEO was described to show how students can be engaged using game-based approaches. Upadhyay and Upadhyay outlined the pedagogical considerations that should be given in developing "English as a Second Language" content for mobile devices.

Carvalho and Bernardo looked at a synchronous tool for online collaboration and training named MOONCONF. MOONCONF is described as a secure, flexible and rich web-based application for web communication for conferencing, collaboration and training. Kotsik and Tokareva describes the projects being implemented by UNESCO in providing education to people with special needs using Information and Communication Technology. Santos and Boticario emphasises on the use of student modelling to support learners while Guha looked at the immense power of learning technology in achieving higher levels in education and literacy.

This newsletter focuses publishing new and emerging technologies in education focussing on advanced learning technologies and its usage in different contexts. Please feel free to bring forward your ideas and views.

Besides, if you are involved in research and/or implementation of any aspect of advanced learning technologies, I invite you to contribute your own work in progress, project reports, case studies, and events announcements in this newsletter. For more details, please refer author guidelines at http://lttf.ieee.org/learn_tech/authors.html.

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Introduction

A collaborative partnership that endured over nine years resulted in the establishment of a rich computer-based resource of language learning materials. While the linguistic content, the design and the activities did not age, the platform and application used to deliver were both reaching the end of their life-time. In the case of the former, Apple Computer was moving to a new operating System in OS X and at the same time, their HyperCard application was not going to be supported through the OS change and would thus fade away. All CALL resources that had been developed were Apple OS and HyperCard only.

The Process – Part I

It was quickly realised that here was an opportunity to 'future-proof' the resources so that, hopefully, they would not be locked into a particular delivery environment in the future. This was achieved in two ways, based on the type of resource that was being rejuvenated.

The first pathway was to move those text-only based grammar activities to a web delivery environment. At the time, the institution was using Web CT Campus Edition as the Learning Management System (LMS) application of choice, so the first part of the process was to migrate content from HyperCard to WebCT CE. This was achieved by a range of conversion processes, which depended on the original structure in HyperCard. Some were relatively straightforward, others were quite complex.

This first step went only part of the way towards future-proofing, however, as the assessment environment in WebCT CE used a customised structure that did not necessarily ensure easy migration to other web delivery mechanisms if the institution's LCMS was to change again in the future.

```
# Start of question: AdjB004
:TYPE:S:
:TITLE:AdjB004
:QUESTION:H
Donnez-m'en une douzaine et..... (demi).
:IMAGE:
:ANSWERS:1
:CASE:1
:ANSWER1:demie:100:0:20:0
:FEEDBACK1:H
:CAT:Adjectives B
# End of question: AdjB004
```

Figure 1: Example of WebCT CE question structure

The transformation was completed when WebCT CE became Blackboard Vista. The resources were migrated from WebCT CE to Blackboard Vista, which uses an xml structure for its assessment environment. As xml is a web delivery standard, this should ensure that the

resources are no longer locked into any one delivery format, and should be able to be migrated into new LMS's or other web browser technology, for example, into the future.

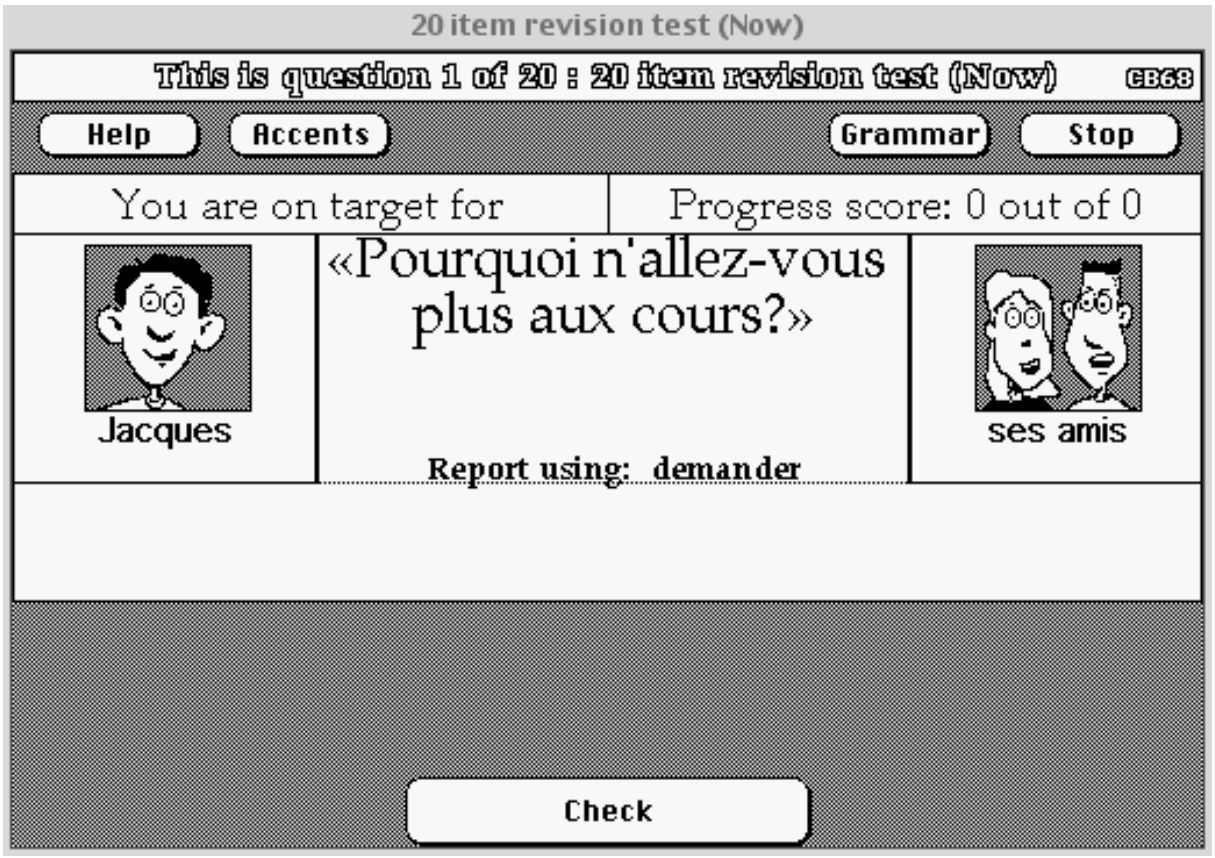

Figure 2 – Example of resource in HyperCard before conversion

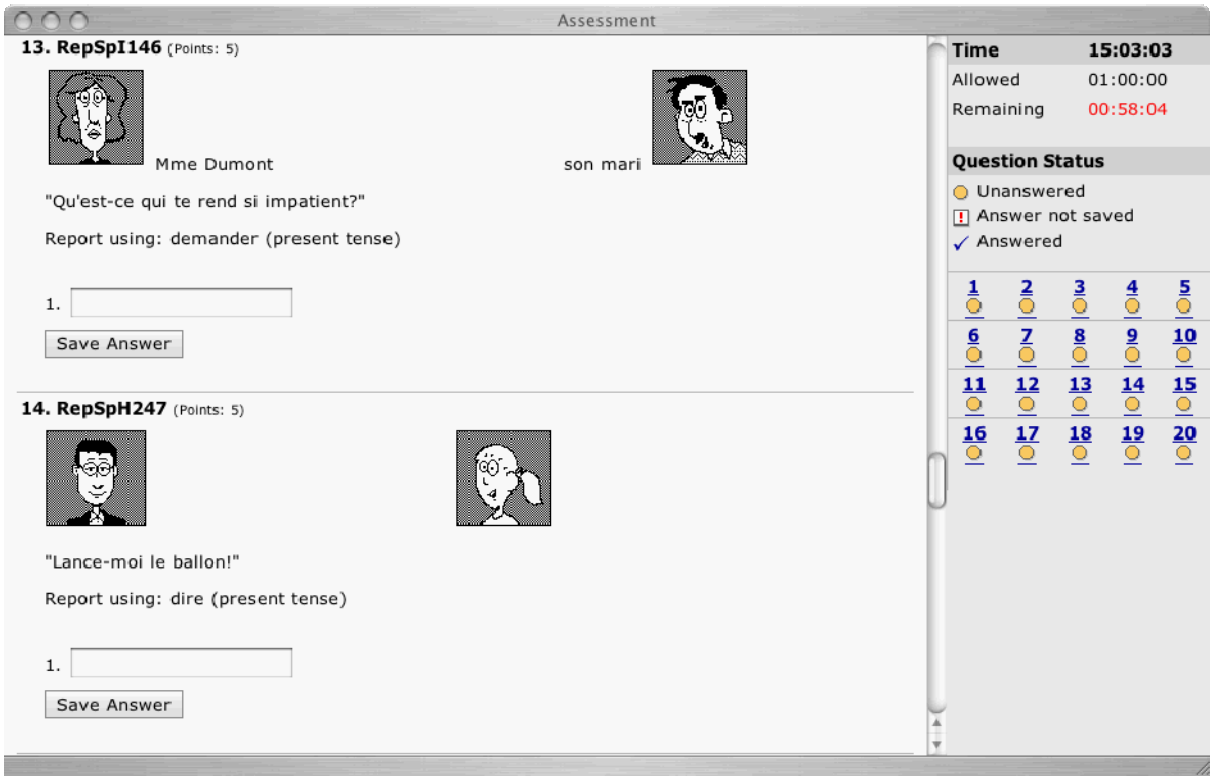

Figure 3 – Example of resource in Blackboard Vista after conversion

As well as ensuring longevity of the product, there were additional benefits achieved in this change. The teacher no longer had to rely exclusively on a programmer to make even the simplest of changes, such as text edits, to the content of the materials. That could now be done directly as Designer of the LMS site. No longer did the teacher need to collect student marks from the various computers that were running the HyperCard resources. Now that is all gathered and reported on from within the LMS and accessed from wherever the teacher wanted to, office, home or wherever there is an internet connection, not just from the computer lab.

The Process – Part II

There was an additional category of CALL activities that existed in the HyperCard environment, and that was a group of resources that could be described as multimedia. That is they were more than just 'text only' but incorporated additional functionality, typically the use of sound files and other interactivity, that often involved divergent branching pathways, depending upon student responses. This level of complexity was not possible in the LMS environment.

The pathway chosen for these conversions was to utilise an application called Runtime Revolution, which is able to open native HyperCard stacks and then enable rewriting, conversion, redevelopment and delivery as Runtime Revolution standalone applications. While converting the scripts was reasonably straightforward, converting the magnitude of sound resource files was another matter again. This was due to the manner in which HyperCard stored this kind of resource (internal to the application as resource fork

components) as compared to that used by Runtime Revolution (separate external files). This meant that each sound files, for example, had to be converted and saved as a single file, and there were literally thousands of them.

The major benefit of this conversion, however, was that no longer were these resources available on Apple Macintosh computers only – the longevity problem being addressed. Once developed in Runtime Revolution, the resource could be saved in a variety of standalone, self-running applications for a multitude of environments including, Macintosh OS 9 Classic, Macintosh OS X (Universal, Power PC or Intel), Windows, and soon Linux and Unix.

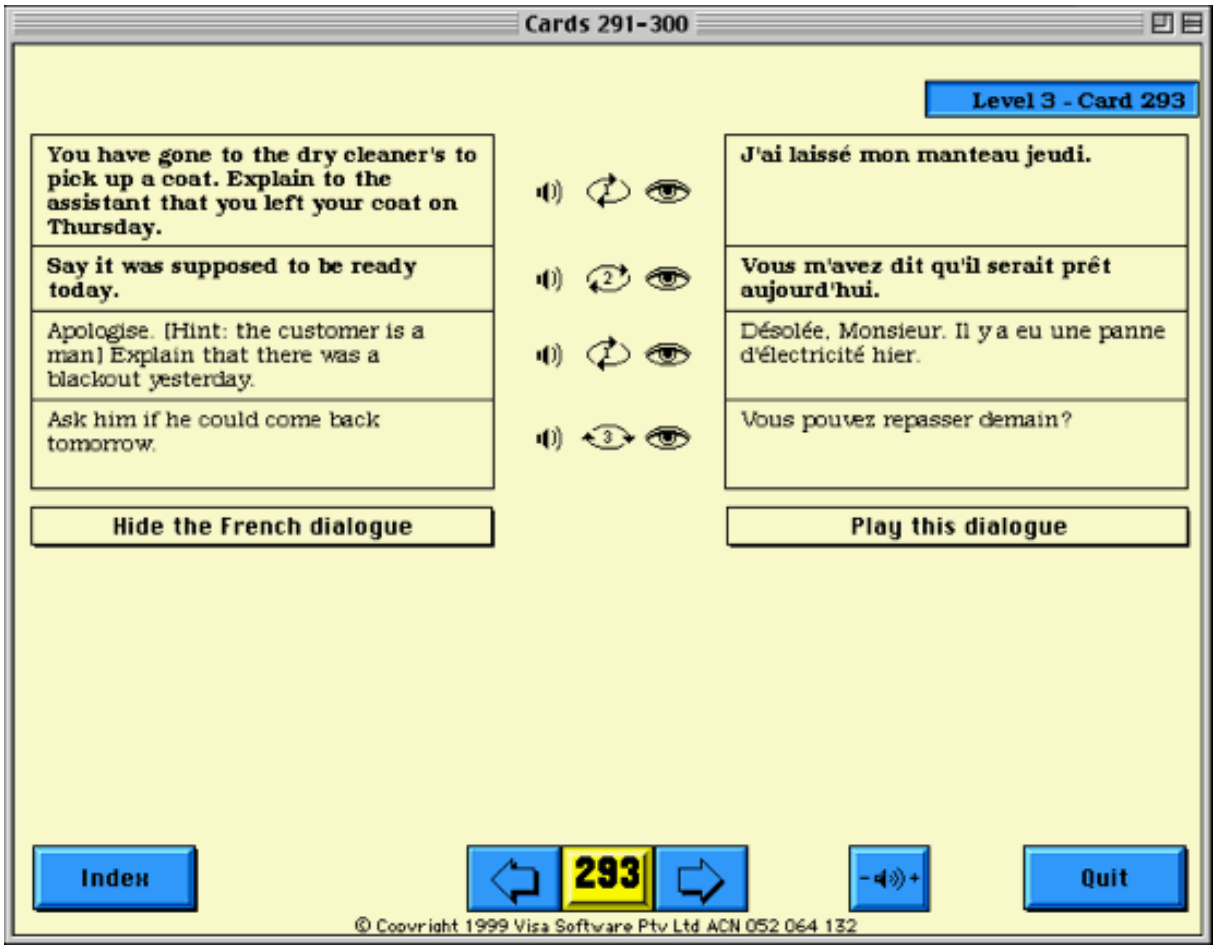

Figure 4: Example of resource in HyperCard before conversion

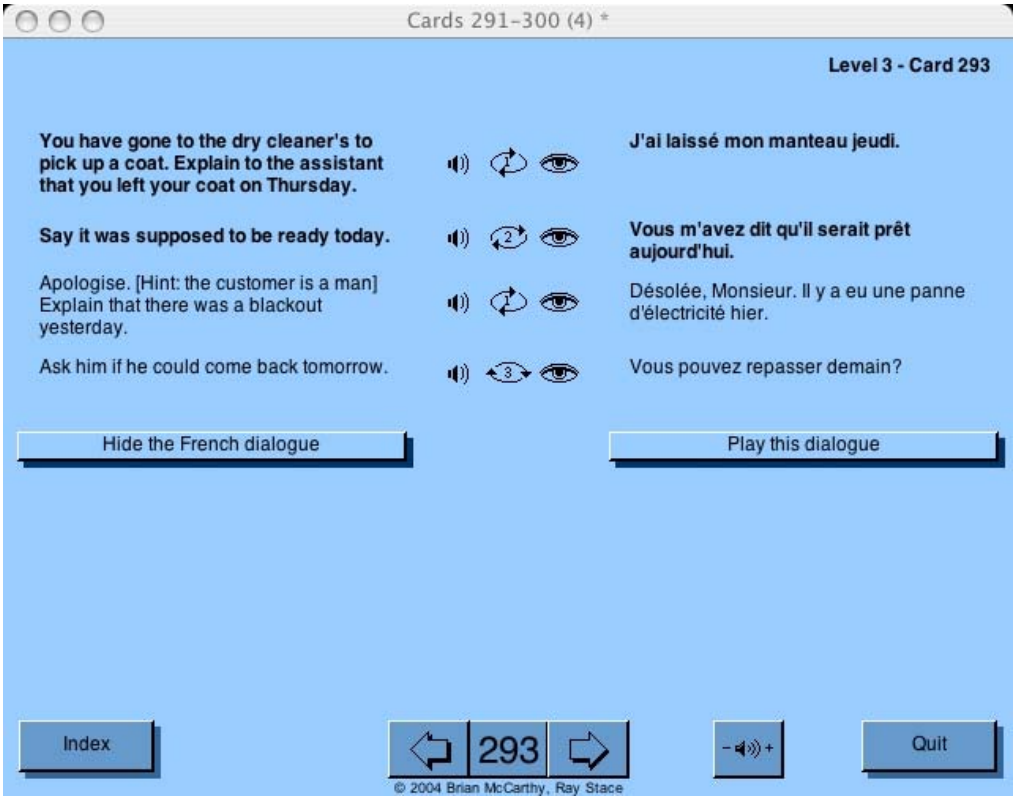

Figure 5: Example of resource in Runtime Revolution after conversion

Conclusion

Thousands of hours of CALL resources that have been an integrated part of French language teaching over many years have now been given a new lease of life – hopefully at least another 15 years to match the length of life to date. In the meantime, who knows in what direction web 2 applications may take us.

References

An understanding of the scope of the whole CALL projects and the resources generated can be seen by referring to the publications by McCarthy [link: http://www.uow.edu.au/arts/selpl/scd/UOW018761.html] and similarly the publications by Stace [link: https://misprd.uow.edu.au/ris_public/WebObjects/RISPublic.woa/wa/Staff/selectPerson;jsessionid=25518C663CAB83571252D1BF4B8C5C68?id=10008&group=157].

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NUCLEO an adaptive role game based scenario

Abstract Traditional university instructional formats and methods are experimenting an increasing lack of effectiveness, mainly because student's lack of motivation. The NUCLEO e-learning system tries to approach the learning scenario to the engaging and immersive formats of the videogames. It provides a futurist scenario in which students (represented by avatars) have to collaborate to solve a learning "mission". The proposal is based in two socio-constructivist approaches, problem based learning and computer supported collaborative learning and it makes use of adaptation techniques to optimize group effectiveness and to individualize the educational strategy by considering students' learning styles.

Introduction

The Net Generation has arrived to university and college. They have grown up using technology for almost any activity which has surely affected the way they perceive and interact with their environment. In this context, most university instructional methods, anchored in traditional text based formats, suffer from an increasing lack of student's interest. The educational community is starting to feel that the learning applications may benefit by taking some of the engaging features of videogames and Internet tools [Prensky 2001].

NUCLEO is an e-learning environment that combines active and collaborative learning with the engaging formats of videogames and virtual worlds. Deeply grounded in the socio-constructive pedagogical stream [Vygotsky 1978], takes the learner (represented by an avatar) into a futurist scenario where he has to solve a difficult mission working in collaboration with other students inside a team. Therefore, the system combines the problem based learning (PBL) and the computer supported collaborative learning (CSCL) approaches in a framework that uses a multiplayer role videogame as the delivery format.

In a collaborative learning context, groups are a key factor in the success of the learning experience. A positive learning experience might turn into a negative one depending on the group composition [Alfonseca, Carro, Martín, Ortigosa, Paredes 2006]. NUCLEO makes use of adaptation techniques to optimize student's interaction (by grouping students according to their learning habits) and to provide personalized learning activities in order to address their specific learning needs.

Adaptation model in NUCLEO

PBL and CSCL are increasingly popular instructional methods that require learners to actively gather and apply knowledge in order to solve ill-structured real-world problems. However research has shown that the implementation of these approaches is a challenging task. Among the variety of reasons (see [Miao, Holst, Haake, Steinmetz 2000]) literature stresses that the students easily loose focus and get frustrated by lack of adequate guidance and help. This fact implies that effective PBL requires the tutor to provide a lot of personal attention to the students. Nevertheless an implicit assumption in collaborative learning is that students working in groups will learn from and teach one another. NUCLEO uses this assumption in the form of an adaptation model conceived to combine students in a way that helps making tutor task a little less demanding by distributing part of his role to the students themselves.

Adaptation can be characterized as the ability of an e-learning system to adapt to different conditions over time. In general, the adaptation process can be described by three stages: retrieving information about the user, processing the information to initialize and update a user model, and using the model to provide the adaptive behaviour [Brusilovsky, Maybury, 2002]. In NUCLEO we consider student's learning style according to Vermunt's conception for constructing a user model. Vermunt's framework contains relevant information about student's capabilities towards the learning process that are, in our opinion, very useful for optimizing team performance; it includes several student's characteristics concerning their learning habits that may lead to determine how capable is a student of driving his own learning process and how much of teacher guiding he needs. Along with the group formation the student's learning style determines the role he plays in the learning scenario by conditioning his duties in the proposed mission as well as the tools he is allowed to use. Also individual learning activities are proposed to the student depending on his role in order to address specific learning needs of his learning style type. Therefore, the student's learning style is the determinant of the adaptation process (i.e the aspect of the learning experience which drives the adaptation or "on what is the adaptation based") and the constituents (i.e. the aspects of the learning experience subject to adaptation or "what is being adapted") are the teams and the learning strategies [Brusilovsky, 1999].

Among the variety of proposals for user modelling [Brusilovsky, Millán 2001], we use a dynamic stereotyping model that responds to the following adaptive cycle: At the first step the system classifies the student into a certain learning profile by gathering the information required using a simplified version of the "Inventory of Learning Styles" created by J. Vermunt. Then the adaptation engine has to update and maintain this profile using data from the student system interaction. We obtain it from three sources: the individual activities, the results of the collective missions and the evaluation from the rest of the members of the team of one particular student.

Adaptation of the learning strategy is supported by associating instances of the element role provided in the IMS LD specification to the different student profiles. As the different learning activities are conceived to be performed by a certain role, we have created roles for every defined learner profile (in our case for the considered learning style types).

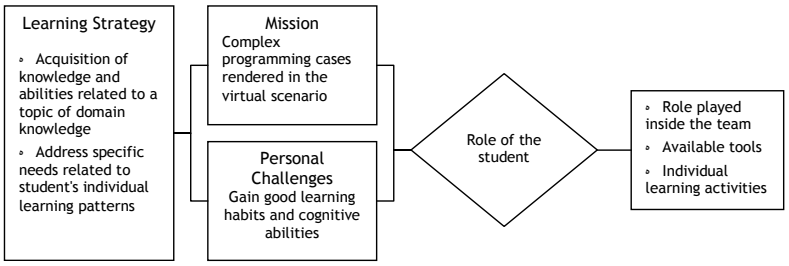

Figure 1. Structure of a learning strategy

Conclusions and Future Work

In order to prove our hypothesis, a pilot system is currently being tested to teach a programming course in C++ this semester at the Physics Faculty of the Universidad Complutense de Madrid in Spain.

References

Alfonseca, E., Carro, R. M., Martín, E., Ortigosa, A., Paredes, P. The impact of learning styles on student grouping for collaborative learning: A case study. User Model & User Adapted Interaction. Vol 16. 2006. 377-401.

Brusilovsky P, 1999. Adaptive and Intelligent Technologies for Web-based Education, Kunstliche Intelligenz, Special Issue on Intelligent Systems and Teleteaching, 4

Brusilovsky, P., Maybury, M. T., 2002. From adaptive hypermedia to the adaptive web. Communications of the ACM, 45(5), 30-33.

Brusilovsky, P., Millán, E. "User Models for Adaptive Hypermedia and Adaptive Educational Systems". P. Brusilovsky, A. Kobsa, and W. Nejdl (Eds): The Adaptive Web, LNCS 4321, pp. 3-53, 2001.

Miao, Y., Harrer, A., Hoeksema, K., Hoppe, H. U., Modeling CSCL scripts – A reflection on learning design approaches. Scripting Computer-Supported Collaborative Learning. Cognitive, Computational and Educational Perspectives. Fischer, Kollar, Mandl, Haake (Ed.) Springer, 2007.

Prensky, M. Digital natives Digital inmigrants. On the Horizon. NCB University Press, Vol 9. No. 5, October 2001.

Vygotsky, L. S. Mind in society: The development of higher psychological process. Harvard University Press, 1978.

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Pedagogical Issues for Developing ESL Course on Mobile Phone

Abstract So far researchers and theorists have focussed on issues related to on-line/e-learning to develop effective English as Second Language (ESL) course content. This article makes a paradigm shift from e-learning to m-learning in that it highlights pedagogical issues that should be considered for designing ESL course content on mobile phone. It also discusses how ESL course structure should be designed for effective m-learning. In addition, the article also talks about the limitations of the mobile phone (in relation to the development of the ESL course content) along with the solutions.

Key Issues for developing ESL course on Mobile Technologies

It has been identified that "The newest technological revolution" is the convergence of mobile, handheld and wireless communication technologies (Wills, 2001**)**. Mobile phones are available in the wide varieties of capabilities and features as shown in table 1. The growing popularity of mobile phones are because of its small size, personal assistance, pre-installed application for basic function, WAP enabled, connectivity such as Bluetooth, Wi-Fi and GSM, Real player, e-book, dictionary, and extra memory for future applications. The mobile phones are easy to use and handle. The menus are designed and located as text, graphics and icons by which one can easily recognize the associated function. Navigation buttons controls and touch screen provides a better user interface suited for developing ESL course content.

CAPABILITIES	DESCRIPTION
Portability	Compact physical size
Connectivity	Infra-Red, Bluetooth, GSM, WLAN, Mobile phone SIM, Wi-Fi
Features	Address book, Memo diary, To-Do list, Reminder, Alarm, Calculator, E-mail and WAP Enabled, Real player, Audio player, Video player Flash Player etc.
Memory	Available for Pre-installed applications. Extra memory for the installation of other applications.
Interface	Better Graphical User Interface
Less additional costing	Freeware. Demo and Trial version of Shareware.

Table 1: mobile phone capabilities

Following key issues has been to improve and enhance learning and teaching capabilities using mobile technologies:

- **Context**: Contextual information should not violate learners wish for anoymity and privacy, as there exist significant ethical issues (Lonsdale et, al., 2003).
- **Mobility:** Mobility capability provides students to escape from classroom, which may not be linked with any form of learning or curriculum agenda (Sharples and Beale, 2003).
- **Learning over time:** Feedback and forward learning experience should persist which is based on experience. For this, learning tools such as recording, organization and retrieval of (mobile) learning experience, are needed (Vavoula, 2004).

- **Ownership:** Students want to keep hold and control their personal technology all the time. But within the classroom the scope of technology usage has to be maintained (Savill et, al., 2003).

Pedagogical Considerations for Designing ESL Course Content

The present curriculum on ESL supports mostly static and non-interactive content. However, mobile phone based curriculum provides effective and comfortable development of platform for teaching and learning along with sound instructional practices. The research on readability and comprehension with small screens (Duchnicky and Kolers, 1983; Dillon et, al. 1990) shows that even for very small displays of only a few lines of text, users can read and understand information well. Following issues have been identified for designing ESL course content on mobile phone:

- Keep course content simple.
- Avoid voluminous data.
- Use short and crispy sentences for understanding of grammar.
- Organize the lesson content in a way that it equally emphasizes both receptive and productive skills.
- Use voice recordings for clear pronunciation and articulation of words.
- Record short stories for developing reading skills.
- Incorporate different levels of exercises and quizzes for evaluating the language proficiency of the users.
- Maintain consistency in providing links to the content pages through out the application.
- Always provide links to the main page or index.
- Provide automated evaluation of pronunciation and speaking.
- Use selection list for data entry
- Provide interaction mechanism with the content via student's responses.
- Avoid underline text, as this will be mistaken for links.
- Provide effective learning using multimode applications.

Mobile phones: Limitations and Solutions

There are also some limitations of mobile phones.

- Due to small screen less information can be displayed.
- Inputting data or text is quite inefficient and slow as keys are tiny.
- Because of slow connectivity rich media contents cannot be accessed.
- Due to slow CPU speed and limited memory all the available applications cannot run.
- Limited battery power results in heavy data loss.
- Incompatibility of applications with OS results in crash and operation failure.

Table 2 describes the limitations and the corresponding solutions.

LIMITATIONS	FUTURE SOLUTIONS AND VISION
Small Screen Size	Flexible Paper-Like Film Display
Data input method	Voice recognition, Touch Screen and Pointer, Projection Keyboard, Cursive Hand-writing recognition.
Slow CPU speed	Speed Efficient architecture for CPU
Weak Battery Life	New version of Lithium Battery.
OS	Generic OS for All small computing phones.
Infrastructure compatibility	Middleware for bridging mobile and LAN platform.
Connectivity	3G and 4G mobile capacity, Bluetooth v.1.2.

Table 2 Limitations and Solutions.

Conclusion

Mobile learning enhances the mode of learning as learning becomes easy due to the underlying advantage – 'anytime anywhere'. In m-learning the role of instructor changes from transmitter of knowledge to supervisor of learning resources. ESL learning course material should be created after analyzing the target audience and the available resources. For the growth of m-learning paradigm e-learning community must target on the issues related to the performance, quality and productivity rather than traditional lecture style training or courseware. Incorporating adaptivity, personalization, context awareness and automated intelligence can enhance the mobile learning environment capability. The course content and learning methodology should encompass exercises, quizzes to test knowledge, summary of major ESL learning points, and interaction with the other students and the tutor.

References

Dillon, A, Richardson, J & McKnight, C (1990) "The Effect of Display Size and Text Splitting on Reading Lengthy Text from the Screen," *Behaviour and Information Technology*, 9(3):215-227.

Duchnicky, R L & Kolers, P A (1983) "Readability of text scrolled on visual display terminals as a function of window size," *Human Factor*s, 25:683_-692.

Lonsdale, P, Baber, C, Sharples, M and Arvanitis, TN (2003). A context-awareness architecture for facilitating mobile learning. Proceedings of MLEARN 2003: Learning with Mobile Devices. London, UK: Learning and Skills Development Agency, 79-85.

Savill, Smith, C and Kent, P (2003). The use of palmtop computers for learning. Learning and Skills Development Agency. Available online at: www.m-learning.org/docs/the_use_of_palmtop_computers_for_learning_sept03.pdf

Sharples, M and Beale, R (2003). A technical review of mobile computational devices. Journal of Computer Assisted Learning, 19(3): 392-395.

Vavoula, G (2004). KLeOS: A Knowledge and Learning Organisation System in Support of Lifelong Learning. PhD Thesis, The University of Birmingham.

Wills, S. (2001) Wireless, Mobile & Handheld: Where are our teachers and studentsgoing with their computers? The power of 3. EDUCAUSE in Australisia 2001: The power of 3 Available at: http://www.gu.edu.au/conference/educause2001/content2a.html.

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MOONCONF – A Synchronous Tool for Online Collaboration and Training

Introduction

This short document has three objectives:

- Explore and disseminate further ways for online collaborative education / training;
- Brief description of a synchronous collaborative tool (Moonconf);
- To illustrate how web conference is being used, and can be used, for academia purposes.

Technical Description

Moonconf [1] is a secure, flexible and rich web-based application that provides to companies and individual users, web communication solutions for training, marketing, company web conferencing and online collaboration.

From the company / business side it is presently being used to conduct live / synchronous sessions as meetings and presentations and vocational training (either blended or fully online). The users only need to have a browser, the latest Adobe Flash Player, a webcam and headphones and speakers. Some of the technical features are:

- Web-based application (there is no need to download the application to your PC)
- Slide presentation
- Video-chat (webcam)
- VoIP (audio / headphones and speakers)
- Text chat
- Whiteboard (all participants can interact on blank or ongoing slide presentations)
- View documents
- View videos
- Share files
- Screen and desktop sharing
- Session recordings
- Live virtual tours through the use of an IP camera

All these features can be made available for all users in a synchronous session depending on the session's moderator objectives and choices. Some examples are provided in Figure 1.

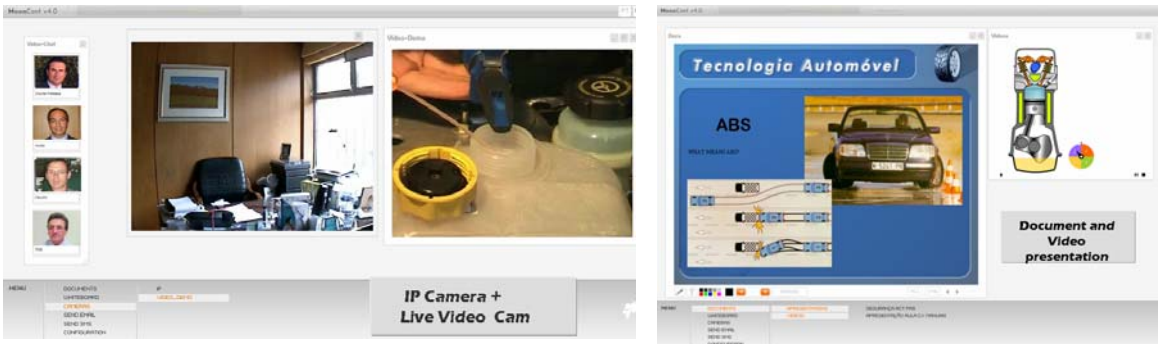

Figure 1. Sample Print screens from Moonconf Synchronous toll

Educational Applications

For educational purposes this application offers students a virtual learning environment (VLE) and a conference room through the web. There are mainly two past and present experiences which are now being redesigned: i) an online collaborative learning environment [2] integrated with F2F sessions (university course supported by online learning and teaching through the use of discussion boards and online interactivity and peer review), and; ii) remote access and virtual tours [3] in order to support cooperation activities between distant institutions (previously performed with the Skype® software as a free VoIP application and a network camera for capturing and sending live video over an IP network). Therefore, there are several ways to successfully integrate this synchronous tool into University students' education:

- It is a web-based application (students simply enter a URL to enter the live conference)
- It is not a "one way" application (moderator → students) but mainly a multi-directional and interactive one
- Interaction can be achieved through text chat, video-chat (and voice) either by the moderator's permission or all together
- For some learning activities [2] it facilitates the collaboration and sharing between students
- Allows for a wider choice of having invited speakers for an in-class seminar [2]

As it is a web-based application it is simple for students to use once a login and password are provided. This can assist students in their group work assignments and for the preparation of F2F oral presentations. Also, the students can also be given the opportunity to virtually visit other Institutes facilities through the use of the IP cam and the video-chat for presentations and Questions and Answers.

Also, Moonconf (Version 4) can presently run in 80 Port, making it available for a wider range of users as there is no need to reconfigure firewall permissions.

References

[1] Moonconf Information - www.moonconf.com

[2] Carvalho, I.S. (2006). Promoting Active Learning in Mechanical Engineering. ASME International Mechanical Engineering Congress and Exposition, November 5-10, 2006, Chicago, Illinois, USA, IMECE2006-15664.

[3] Restivo, M.R., Carvalho, I.S., Mendes, J., Magalhães, R. and Gróf, G. (2006). Remotely Visiting Academic Labs Using ICTs. 34th SEFI Annual Conference - Engineering Education and Active Students, June 28 – July 1, Uppsala, Sweden.

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Provision of Education for People with Special Needs by means of ICTs

Modern society requires education to provide increasing access to knowledge and information. The right to education has become an essential human need and a basic human right, which is crucial to civilization development. In this way, facilities to access quality education for all community members promote opportunities for active participating in civil society, including scientific, economic, social political and cultural activities. Such issues are of primary importance for persons with special educational needs.

Society development influenced by fast growth of telecommunications, media and information technologies, results in penetrating of digital technologies in every sphere of social existence, forming the global information space. New millennium education delivery methods based on the application of information and communication technologies (ICTs) have become the most prevalent way of providing the up-to-date information to students in the quickest and most flexible ways possible. However, whilst ICTs provide new opportunities for participation in society, otherwise, if the technology and information resources are not corresponded with the needs of those who are unable to access information by regular means or in conventional conditions, in its turn, will further intensify social exclusion of those people broadening a digital divide. Considering a wide diversity of individual learners' capacity, the civil society should find the ways to remove barriers to learning and provide appropriate conditions for equal access to education for all its members in spite of their individual requirements or restrictions in information acquisition or perception.

Aiming at reinforcing potential of the UNESCO Member States in ICT application for the development of education, UNESCO Institute for Information Technologies in Education (IITE) concentrates its efforts on the broad range of activities to provide training and retraining for educators in the main aspects of ICT usage in various fields of education. Main directions in the instruction materials development and key trends in educators training are determined in close cooperation with international organizations and leading experts on education and ICTs.

One of the most important directions of IITE activities is concerned with improving quality and access to education for people with disabilities by means of ICTs. The Institute is dealing with these issues within its project "ICTs in Education for People with Special Needs" since 1999. The main objective of the project is reinforcement of national capacities in education and social inclusion of people with special needs on the basis of recommendations development on systemic application of ICTs. Within the frame of this work the Institute held a number of international expert meetings and workshops in partnership with well-known experts from 13 countries, including the United Kingdom, Italy, the Netherlands, Japan, Australia and the USA. Recommendations of international experts provided the basis for the development of information materials and analytical survey "Information and Communication Technologies in Special Education", which show the current state, prospects and main trends of ICT application in special needs education.

Accumulated experience enabled IITE to develop the Specialized Training Course "ICTs in Education for People with Special Needs" (2006). The course was developed by a team of international specialists from Italy, Russian Federation, Australia, Denmark, Iceland and Spain, headed by Dr Edwards (United Kingdom). Materials of the course represent the best

international experience in the field of general and specific ICT applications in education for people with physical, visual, hearing, speech and language, cognitive, and learning impairments. Particular emphasis of the course is placed upon the basic aspects of ICT policy development in special needs education, including promotion of ICT infrastructure, integration of ICTs into curriculum, training and retraining of ICT specialists in special education. Special attention of the training course is focused on developing of acquiring practical skills on application of ICT tools in education. For this purpose during the training sessions the specialists have the opportunity to practice with different kinds of assistive technologies, provided by the representatives of manufacturing companies specialized in software and hardware development.

Specialized Training Course was successfully presented at seven international conferences and attracted much interest among the specialists (France, 2005; Indonesia, 2005; Russian Federation, 2005, 2007; Latvia, 2006, Tunisia, 2007, Egypt, 2007). IITE carried out a number of international training sessions and have trained over 200 specialists from 11 countries.

Since 2007 IITE started elaboration of recommendations for promoting suitable digital environments for education and lifelong learning of persons with disabilities, including the development of the standards and guidelines on ICT usage in education, training of educational and IT personnel on e-Accessibility. For more information concerning IITE training activities you may visit our website http://www.iite.ru or address directly the authors of the article.

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Supporting learners in an inclusive way with standard-based user modelling techniques

Inclusive adaptive support in standard based eLearning scenarios has to be provided by developing adaptive and accessible learning management systems (LMS). On the one hand, personalized eLearning is no longer a research issue in small-scale settings [1], but still does in LMS, and there are concrete challenges related to the usage of standards to provide adaptations throughout the entire life cycle of e-learning [2]. On the other hand, this current centred approach is inappropriate for an increasing number of students, who are supposed to benefit from the personal training but in practice have to face social, physical and cognitive barriers because they have disabilities. Accessible eLearning cannot be achieved with the universal design, but adaptation techniques based on user modelling have to be considered. In this way, the usability of eLearning systems can be increased for all learners, since their interaction preferences and needs are considered.

The paper presents an overview of the on-going work to provide dynamic support to learners during the course execution in an inclusive way. The goal is to apply recommender technology to support learners overcome impasses at course execution (runtime). This implies dealing with several issues. First, the combination of design (static) and runtime (dynamic) adaptations. This approach was applied in aLFanet [2] where the authors of the course were allowed to define, in terms of IMS specifications, different learning routes for different learners' profiles and learning situations at design time (static). However, experiments showed that authors experimented such design as a complex task. Moreover, there are many situations that cannot be foreseen in advance. Universal design approaches does not suffice. Therefore, there is a need for dynamic support at runtime [3] that considers the learners' interactions and their evolution over time.

Second, to provide this support in an inclusive way, accessibility and usability requirements, pedagogical and psychological guidelines, the user access preferences, the user context and the device used while accessing to the course are required. There exist standards and specifications that partially considered these data and can be of help to build an open extensible inclusive user model such as IMS Access For All, ISO Personal Needs and Preferences, CC/PP, IMS Learning Design, WCAG.

An Accessible and Adaptive Module (A2M) [3] is being developed on top of a multi-agent architecture (of Jade agents). The objective is twofold: 1) update the user models from the learners' interactions with machine learning techniques (Weka algorithms) and 2) generate dynamic contextual recommendations during the course execution based on these models and collaborative filtering and collaborative content techniques. It follows a similar approach to aLFanet Adaptation Module [2].

Regarding the user modelling, several types of information are used to feed the machine learning algorithms that will learn some of the user model attributes, those that can be learnt from the learners' behaviour in the system. This information consider (i) the contents characterization (in IMS-Accessibility Metadata), (ii) the course structure (in IMS-Learning Design), (iii) results from IMS Question and Test Interoperability questionnaires, (iv) traces from the learning services such as forums, and (v) statistical data compiled from the progress in the course. All this information allows building models that consider the evolution of the attributes over time. The idea is to have open models that can be accessed by the learners and

are built to improve students' learning increasing their learning performance [4]. Moreover, educational standards facilitate to explicitly define the learning scenario at design time. This static semantic information provides helpful information for the modelling tasks, which can facilitate the building and the dynamically update of the user model from the user and usage data.

In order to support learners at runtime, it has to be described what, when, how and why recommend. At the recommendation process, the context, the record of interactions and the user model are used to produce recommendations. In our approach several agents generate different recommendations for the user at hand. From these recommendations, the most appropriate(s) has to be selected ("the what") and provided at the appropriate moment ("the when"). "The how" deals with managing the stop points and intend to help the learner overcome the impasse. When presented the recommendation, the learner is to be provided with the reason for it ("the why").

The last step is to follow-up the recommendation provided to measure the degree of success. This will give input about whether the learner learns better (because she moves forward the impasse and leaves the stop point). However, it is also needed that the tutor evaluates if the learner proceeded appropriately and verifies that the progress of the learners is due to the recommendation itself (and not to an external cause).

Currently we are working on several adaptation tasks that can be provided to learners. They are framed in current learning situations where learning scenarios are described in terms of standards, where existing learning design specifications are insufficient to cope with the evolving learners' needs and runtime context. This work is taken under the research projects we are involved. In particular, EU4ALL1 (IST-2005-034778), ALPE2 (eTen-2005-029328) and ADAPTAPlan3 (TIN2005-08945-C06-01).

[1] http://www.eu4all-project.eu/
[2] http://adenu.ia.uned.es/alpe/
[3] http://adenu.ia.uned.es/adaptaplan/

References

[1]Brusilovsky,P., Vassileva,J. Course sequencing techniques for large-scale webbased education. *I. J. Cont. Engineering Education & Lifelong Learning*, Vol. 13, Nos.1/2.

[2] Boticario, J.G., Santos, O.C. An open IMS-based user modelling approach for developing adaptive learning management systems. *Journal of Interactive Media in Education* (in press).

[3] Bull, S. and Kay, J. A framework for designing and analysing open learner modelling. *12 International Conference on Artificial Intelligence in Education*. Workshop 11, Kay, J., Lum, A., Zapata-Rivera (eds.), p. 81-90, 2005.

[4] Santos O.C. Dynamic recommendations to support 'all' in open standard-based adaptive learning environments. In *Proceedings for the 1st Doctoral Consortium. 13rd International Conference on Artificial Intelligence and Education*, 2007.

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Radicalizing Education…

Communication technologies today are being increasingly linked to education. In fact the two are inseparable. It all began with the phenomenon called "Distance Education" which is popular in most parts of the world as it is adult education, continuing education, training, digital education and professional education. Technology became inextricably connected with it, as technology is cost effective, breaks the barriers of time, place and space and it also has a wide reach Technology and education thus become concomitants and inseparable entities.

Distance Education uses efficaciously components of technology, the print media and the electronic media; broadly speaking. Now, electronic learning in the form of the mobile and the internet is talked of today. Both can be used for the teaching learning processes synchronously and asynchronously. Added to this are audio video conferences.

My experience as an academic administrator in the Indira Gandhi National Open University for the last fifteen years or so has enabled me to understand clearly the following perspectives:

a) 'low cost' technology such as the radio is very popular in most regions of the country. The radio is accessible, cheap, and contrary to popular belief that it is outmoded, is becoming very popular with the advent of FM Channels. I am speaking in terms of the Indian context,
b) two way audio and one way video tele-conferencing which is also cost efficient is effective but we have not been able to reach all areas beyond the capital cities of states due to complexity of reasons such as paucity of electricity, lack of TV relay stations, lack of motivation of teachers and learners.
c) However in the cities and towns of the country the use of the internet is popular, because of the mushroom growth in cyber cafes. Education most now be both, entertainment and education, which has a popular connotation 'edutainment'.
d) The popularity of the community radio and FM radio stations.
e) The popularity of podcasting and use of the skype and yahoo messenger. These have the potential for educational change and transformation.
f) The mobile can and should be used as a e-learning source where text messages can be used as interactive modes. The same is of course true of the internet where the text and voice 'chat', are potentials for 'edutainment'.

I am trying to contextualise things in a country with diversities in social and economic development of a sharp nature. So, in such a situation technology should be judiciously and appropriately used. The wide disparities in economy, with the given diversities in social and geographical conditions automatically bring in the digital divide.

It is here where e-learning communities and non-governmental organizations can play catalyctic roles and be 'instruments of social change and development. In the south of India there is a community radio site which allows for podcasting, articles by thinkers on economics, sociology and culture. The site is : www.voiceofambition.com. There is another e-learning group led by a journalist Frederick Naronha : bytesforall_readers@yahoogroups.com which gives synoptic views of ICT applications in developing countries: the focus is on India, Bangladesh and some of the African countries.

The examples given here are eye openers to demonstrate how technology has radicalised social, educational and economic development.

I am now trying to narrow down realities:

- if technology benefits only urban areas, the question of development really is not addressed.
- the crisis continues
- 100 % literacy in a country which has about 65 % - how do we use the digital technology to achieve this goal.
- can we think of community learning centres in villages where software for using the local languages is prevalent ?

These are all complex questions in a country of diverse ethnicity and cultural/religious pluralism. In the final analysis technology is integrated; audio, video, the computer and mobile phones. Such integrated features of technology is, in my opinion the bases for change: ushering in literacy and in its broadest sense - 'Education'.

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